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Theoretical and Empirical Links Between Strategic Groups, Cognitive Communities, and Networks of Interacting Firms

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Abstract

The links among strategic groups based on asset configurations, cognitive communities based on shared beliefs, and networks of cooperation and competition among rivals have examined in a series of empirical studies. A considerable amount of overlap was found among the constructs within the Scottish knitwear and UK grocery retailing industries. These findings could not be replicated in the US computer software development industry. While there are a number of plausible explanations for the differences in findings, the deviations may be a function of the rate of change and the ambiguity associated with the structure of the industry. A cycle of reciprocal causation proposed. Economic factors (industry structure) influence psychological factors (the perceptions of economic incentives). Related cognitive processes within individuals drive organizational processes among individuals (group decision-making within top management teams) which drive organizational processes among firms (the social enactment of markets). The causal chain comes full circle as this social enactment process influences economic factors (industry structure). Some slippage may be induced in these causal links due to uncertainty and ambiguity arising from (a) imperfect information regarding the economic forces currently operating in a particular niche, and (b) an inability to forecast the the future structure of the industry due to the threat of technological or regulatory changes. This may hinder the movements of markets towards optimal solutions. Amending Adam Smith's metaphor, "the invisible hand" tends to waiver in ambiguous markets. Hence, as ambiguity increases, cognitive and socio-political processes will have a greater influence on (a) decision-making within the firm, (b) patterns of cooperation and competition among firms, and ultimately (c) industry dynamics.

Theoretical and Empirical Links Between Strategic Groups, Cognitive Communities, and Networks of Interacting Firms

Phenomena studied in strategic management research often can be viewed through more than one lens. Some of the more widely drawn upon perspectives include industrial/organizational economics, OB, and psychology. Generally, each perspective can capture a part of a given strategic management phenomena, but like the parable of three blind men feeling an elephant, an integrated understanding is rarely obtained. Despite the potential benefits of an integrative perspective, there has been little progress in synthesizing the various theories. The primary difficulties stem from incompatible assumptions, differences in units of analysis, etc.

Assuming that an integrative approach is not possible, there have been calls for a multilectic approach in which a (partially) incommensurate theoretical perspectives are juxtaposed. Huff (1981, p. 87) argues that "the culture clash between genuinely different points of view can be an important basis for the development of knowledge." Such clashes can stimulate creative thinking. This may lead to the extension of existing theories or the development new ones.

In addition to eclectic theoretical efforts, empirical research may be used to support or reject theoretical overlaps. The collection of new data may facilitate inductive reasoning that may help extend and integrate existing theories or develop new ones. Unfortunately, many empiricists avoid multimethod research because it requires more effort. Also, discrepancies across methods often arise. Many analysts wrestle endlessly with such discrepancies under the assumption that failing to find perfect convergence indicates a flaw in the design or an error in the analyses.

While it is often desirable to observe similarities across methods (e.g., to empirically support theoretical relationships), it might also be useful to emphasize the dissimilarities across methods to underscore the need for multimethod research. Rather than framing the discrepancies as "noise" or "errors," it might be fruitful to frame the discrepancies as diagnostic information that could further efforts to integrate the various perspectives. This essentially reverses what is often considered as the foreground and the background. Such discrepancies may be the most

informative data of all. For example, they may point to factors that sway cognitive and organizational processes away from economic rationality.

Of course there are many other possible causes for such discrepancies, and strategy researchers will have to be clever to tease out these factors. As economists often suggest, "If it was an easy problem to solve, someone would have done it already." Yet strategy researchers should not shy away from such problems.

Researchers in neighboring fields like economics, OB, and psychology generally must focus their efforts within their respective fields. Evaluations for tenure and pay within a given department tend to be influenced more by publications within journals recognized as relevant by members of that department. In a publish or perish environment, this often forces researchers into a relatively focussed strategy for research. That is, given a lack of incentives for interdisciplinary research in those fields, researchers may be less inclined to expend their resources (e.g., time, effort) to gain exposure to, and publish, in other streams of literature.

In contrast, strategic management is the field that claims to integrate these and other streams of research. Presumably, this is the value added by strategic management. By the very nature of the field, researchers in strategic management are simultaneously exposed to a variety of theoretical perspectives on a daily basis. This constant exposure should prime the pump for multilectic (if not truly integrative) thinking. This is a potential source of competitive advantage for strategic management vis-a-vis other fields.

Unfortunately, strategic management is often viewed as an applied area that simply imports theories from a variety of more theoretically oriented fields. For example, the relationship between strategy and economics has been compared to the relationship between engineering and physics. While practitioners may benefit from such an orientation, there is very little value added for researchers if a multilectic approach merely applies several perspectives without building on the insights gained from juxtaposing them. This may do a serious disservice to the field by ignoring the opportunity for interdisciplinary theory development.

Perhaps another metaphor could be found that would suggest the potential value added by strategic management research. Economics could be likened to Newtonian physics in that it studies certain forces impinging on an object (e.g., an organization, and industry). OB/OT could be likened to chemical engineering in that it focuses on the properties of the objects or the medium being acted upon (e.g., an organization, and industry) and often endeavors to redesign or create novel forms with more desirable properties. Strategic management could be likened to fluid dynamics: the medium and the forces acting upon/within it are inherently intertwined and cannot be meaningfully separated. This alludes to the inseparability of the content and process sides of strategic management (e.g., formulation and implementation).

So, while economic incentives may be the best single predictor of business transactions, people are negotiating the deals and making the decisions. While the conduct within a market may be drawn toward economic rationality, cognitive and social forces may produce friction inhibiting the move toward economically rational patterns. These forces may even drive the patterns in economically irrational directions. Metaphorically, an organization or institutions (e.g., an industry) is like a viscous medium that generally flows in a predictable direction (i.e., toward economical rationality), but due to the nature of the medium, it is predisposed to the formation of eddies and backwashes which temporarily impede and even reverse this flow in some niches.

In this paper, an attempt is made to merge three streams of research that flow into strategic management: industrial/organizational economics, OB, and psychology. The formation of collectives within industries is viewed from each of these perspectives. After defining the theoretical constructs associated with each perspective, the relationships between the constructs are discussed. Empirical studies in three industries are used to test the relationships among these constructs. Findings vary systematically across industries. A theoretical framework is proposed to explain these discrepancies and to integrate the three theoretical perspectives. Finally, two cognitive models are developed to test hypotheses regarding the strategic action of firms, networks of interactions among firms, and industry dynamics.

Collectives from Different Perspectives

One approach to merging different theoretical perspectives is to compare analogous constructs from those perspectives. For example, collectives within industries have been examined using theories from psychology, industrial/organizational (I/O) economics, and organizational behavior (OB). Three analogous theoretical constructs are associated with these perspectives: cognitive communities, strategic groups, and networks of interacting firms (respectively). In this section, definitions of these constructs will be proposed, and the theoretical overlap among these constructs will be discussed.

Cognitive Communities

Managers are influenced by economic incentives, but only indirectly through their perceptions of those incentives. Managers are operating under bounded rationality. If a manager does not perceive an economic incentive, that incentive will have no influence on the manager's choices regarding either internal actions or transactions with other firms.

Managers are motivated to make accurate assessments of opportunities and threats in the environment as well as strengths and weaknesses of the firm. In this sense-making process, cognitive structures such as taxonomies of firms and causal maps are used to link strategic actions to performance. In this way, managers are drawn toward economically rational decisions, but imperfectly so. The situation is complicated still further in that no manager is in this alone. Each individual is surrounded by others who are equally unable to flawlessly perceive "economic reality" (although some of them would not admit it, not even to themselves).

The relative profitability of various patterns of interactions are learned (a) directly through trial and error, (b) vicariously through observation, and (c) learning through instruction via word of mouth, trade publications, industry observers, etc. Applying a population ecology view of the survival a dispersion of ideas throughout the niche, beliefs that approximate the economic reality of the industry will survive longer and disperse more widely than less accurate beliefs. Ultimately,

the less accurate beliefs will be forced out as the more accurate beliefs diffuse among actors and become widely shared.¹

Cognitive maps are essentially informal theories; those that best explain this data are retained, while those that have accumulated a large number of anomalous observations are discarded (Kuhn, 1962). This process results in a socially constructed understanding of what works given the way that the industry is structured. Those sharing the resulting set of beliefs constitute a cognitive community (Porac and Thomas, 1990; Porac, Thomas, and Baden-Fuller, 1989). The consensual set of beliefs make up the norms or recipés for doing business in an industry (Spender, 1990).

Two definitions of cognitive communities are proposed. The weak definition is based solely on similarity of cognitive structures (e.g., taxonomies of rivals, causal map); the strong definition additionally requires active interactions, mutual influence, and collective cognitive efforts.

Individuals that have similar beliefs about a given transaction will be more likely to interact than those with dissimilar beliefs. Hence, similarity of beliefs increases the likelihood of transactions. On the other hand, as firms interact, they may mutually influence each other through the diffusion of information and shared learning through direct experience. Hence, interactions increase the likelihood of shared beliefs.

Under the strong definition, it is conceivable that the cognitive community could collectively extend the boundaries of rationality by pooling existing information and cognitive resources. The Japanese approach to developing a fifth generation computer illustrates the potential power that collective action can have in solving complex problems.

Rather than directing the pooled efforts toward a particular technological challenge, members of a cognitive community may direct their efforts toward solving specific strategic management issues and finding optimal patterns of transactions. For example, members of a

¹Escalating commitment and other psychological factors may motivate some managers to push ideas in spite of failures (at least temporarily).

cognitive community might jointly identify a cooperative pattern of interactions that yields satisfactory profits for all its members without a negative impact on social welfare. Identifying such win-win solutions is often quite difficult. Intuitively, such solutions might be easier to identify if the parties pooled their resources rather than separately trying to identify a solution that the other members would accept. Some problems require a coordinated effort to get a solution.

Cognitive communities reflect a predominantly psychological view of large collectives within industries. If a economic orientation is adopted, the focus would not be on cognitive communities. Strategic groups might be a more appropriate way to frame certain issues of collectives within industries.

Strategic Groups

As noted in the discussion of cognitive communities, firms observe their competitors to gain information about what works in the environment (Porac, Thomas, and Baden-Fuller, 1989). If one firm finds positions itself in an extraordinarily profitable niche, some of its competitors will be tempted to follow it (Scherer, 1980; Tirole, 1988). As a result of this process, firms are expected to converge on the strategic positions that yield the highest levels of performance.

As new firms enter a niche, demand is divided among more competitors. Hence incumbent firms experience a decline in their respective market shares, and subsequent entrants tend to gain smaller portions of the market (Scherer, 1980; Tirole, 1988). "This process should continue until the opportunities for making a supranormal profit have been exhausted" (Scherer, 1980). Mobility barriers (Caves and Porter, 1977; Fiegenbaum and Thomas, 1987; Tirole, 1988; Caves and Ghemawat, 1989) and uncertain imitability (Lippman and Rumelt, 1982) lowers the economic incentives for potential entrants and helps to preserve economic incentives for incumbents.

Firms seek the most profitable niches that they can successfully defend. The firms with the best fit to environmental demands get the lion's share of the profits. The weaker firms (i.e., those ill-fitted to the environment) are left to scramble for footholds in the less attractive niches. This process tends to bunch firms together in a number of profitable niches identified in the industry.

These naturally occurring bundles of firms have been labeled strategic groups (Porter, 1980; McGee and Thomas, 1986).

Explicit in the structure-conduct-performance paradigm is that firms in the same niche will follow the same strategy because they are influenced by the same forces. That is, given a change in industry structure, all firms should take the same action. This is assumed to be true even if each firm is acting independently: collusion is not necessary for firms to act in parallel.

This economic view focuses on the environment outside of the firm. A resource-based view of the firm is more inward looking. Strategic groups are clusters of firms with similar strategic positions. Firms may have different asset bases and still hold the same strategic position depending on the way that the assets are configured. While the focus of the economics approach differs from that of the resource-based view, the implications are the same. Firms within strategic groups are expected to behave in similar ways. A weak definition of strategic groups could be based on similarity of asset configurations either as a means of operationalizing firms within similar niches or firms with similar resources.

While the concept of strategic groups has a strong I/O economics orientation, it has been extended to more eclectic view of the phenomenon. Implicit in the term "strategic group" is that the firms in a given group are pursuing a common strategy. That is, they have similar goals and beliefs about how to obtain those goals. Taking a cognitive/decision-making orientation, a semi-strong definition of strategic groups adds the constraint of similarity of cognitive structures.

A strong definition of strategic groups could be based on the interdependence of firms within a given niche. Firms sharing a common niche may have conflicts with respect to inputs (e.g., transactions with suppliers), throughputs (e.g., labor, equipment), and/or outputs (e.g., distribution channels, direct transactions with consumers). The actions of Firm A could affect the profitability of Firm B, and vice versa. This interdependence can be viewed as a mixed motive game.

Porter (1980) suggests that this interdependence is the essence of oligopoly. Multipoint, cut-throat competition would tend to reduce profits of all the firms in this niche, while cooperative

(collusive) behavior would allow firms to take greater profits (with monopoly rents as an upperbound) (Scherer, 1980). Typically, a mixture of cooperation and competition evolves. However, as interdependence becomes more defused (e.g., firms can not effectively punish specific rivals), the degree of competition will tend to increase.

Cooperation may be relatively passive. For instance, firms may simply agree not to compete on a particular strategic dimension such as price or quantity of output. A more active form of cooperation might involve collective strategies involving coordinated, joint actions. Cooperation may be aimed at achieving a common goal (e.g., finding a cure of AIDS). Alternatively, actions could be directed toward firms outside of the group. Such actions could be offensive (e.g., collective advertising to increase joint market share relative to the rest of the industry) or defensive (e.g., erecting mobility barriers).

While firms within the group may have to compromise with other members of the group when forming a collective strategy, the process may broaden their options overall. By supplementing and/or complimenting each others assets, a collective may compete in ways that none of its member firms could (Penrose, 1959). This may include attempts to manipulate (enact) industry structure.

From a strategic management point of view, this joint action is perhaps the most intriguing aspect of strategic-groups. The weak and semi-strong definitions of strategic groups suggest that firms within groups will have parallel reactions to environmental change. This helps to simplify industry analyses for strategic planning purposes (Porter, 1980). In contrast, the strong definition of strategic groups as networks of interacting firms enriches industry analyses by considering more sophisticated forms of strategic behavior such as collective strategy (Astley, 1984; Bresser and Harl, 1986; Nielsen, 1988). It is unfortunate that such networks of interactions are generally ignored when operationalizing the strategic group construct.

The need to address coordinated efforts among individuals is apparent in both the strong definitions of strategic groups and cognitive communities. Therefore, we turn to issues addressed by social psychology, sociology, OB, and the like.

Networks of Interactions Within and Among Firms

An open systems perspective is used to examine networks of interactions within and among firms. Firms are relatively formal systems of interacting individuals. They represent hierarchical nexuses of relatively long-term contracts (Eisenhardt, 1985). The hierarchical nesting can be extended as firms are embedded in larger systems such as industries (Jemison, 1981; Fombrun, 1986). In addition to being hierarchically nested, these networks of individuals may be partially overlapping within and across levels of the hierarchy. For example, individuals may interact within networks constituting (a) firms, (b) professional interest groups, (c) unions, (d) families, etc. These networks may overlap any number of times and the nature of relationships between any two individuals may be extremely complex.

As each individual may belong to a unique set of networks, each individual can be viewed as an agent that must answer to a unique set of principals. Each individual has a personal agenda integrating the contingencies imposed by the various principals. Hence, it may be quite useful to decompose the network of interactions between organizations into embedded networks of interactions of individuals within and between those organizations.

The concept of a firm represents a cognitive (and legal) simplification that facilitates perceptions of whom is doing what (March and Simon, 1958). While it is often expedient to talk about a "firm's response" to events in its environment, focusing on the firm may oversimplify certain problems.

Consider March and Simon's (1958) argument that a price mechanism and profit maximization goals for the separate parts of a production process could be used to predict firm behavior. These predictions should parallel those made when examining the firm as a whole. That is, macro level maximization follows (more or less) from micro level maximization if the criterion used at the micro level are appropriate. This is the notion of the invisible hand. Under these conditions it is not necessary to analyze the component parts of the firm; the solution set obtained

by decomposing the firm into individuals and that obtained by considering the firm as a whole are isomorphic.

However, if (a) the profit maximizing goal is replaced with a satisficing goal and (b) pricing mechanisms are based on imperfect factor markets, it is not certain that the behavior of individuals and coalitions will result in optimal patterns of behavior for the firm or for social welfare. The invisible hand might waiver. Therefore, to predict the interactions among firms, it may be necessary to consider each firm as a network of individuals and examine the intersections of those networks.

While predictions based on individual level and firm level analyses may differ under certain conditions, the processes involved at each level may be quite similar. March and Simon (1958, p. 131) state,

Many of the phenomena of intergroup conflict within organizations are almost indistinguishable from the phenomena that we might consider under the present heading [interorganizational conflict]. The distinction between internal and external relations for an organization is frequently a cloudy one.

In a similar vein, Hennart (1990) argues that the distinction between processes within firms and markets is a matter of degree. Firms emphasize behavioral controls; markets emphasize price controls. There are few pure forms. By far, the majority of institutions have a mix of behavioral and price controls. Models that take both forms of control into account should be able to smooth the transition from predictions within firms to those between firms. The underlying processes do not change.

Networks within firms. Williamson (1975) proposes that individuals cooperate to form peer groups or hierarchies in order to mitigate the impact of bounded rationality and to reduce their transactions costs. More generally, individuals enter into groups and organizations to obtain personal benefits that they could not readily obtain on their own (Penrose, 1959; March & Simon, 1958; Axelrod, 1984).

Networks often form serendipitously as transactions among participants evolve over time as parties try muddling through. There need not be a consensually held ideal or common goal. On the other hand, networks could be developed intentionally. To enact a vision of a market, an entrepreneur could identify potential participants and convince a sufficient number of them that the interactions would be profitable with an acceptable level of risk. While the most widely accepted motivation involves economic incentives, there may be a broad range of reasons for participating in transactions (e.g., personal interests, charitable/ethical considerations, image). A shrewd entrepreneur will often emphasize the idiosyncratic set of non-economic incentives that are salient for a given participant, and use these as bargaining chips to reduce the level of economic incentives necessary to induce participation.

Routines (and the complex social systems they are embedded in) can vary in cost. The most efficient routines are self-reinforcing and, therefore, self-perpetuating. To sustain less efficient routines, the firm might have to pump in resources to reward past participation and maintain a satisfactory expected utility for future participation.

According to March and Simon (1958), the survival of the firm depends on how much it costs to run the routines relative to the price that the consumer is willing to pay for the product or service. If the price is at least as great as the cost, then the participants can receive the expected level of rents. The routines will continue to fire as expected until the perceptions of the payoffs change. If the expected utility of performing a part of the routine drops below aspiration levels, and/or a superior alternative is perceived (Thibaut & Kelley, 1959), any given member might withdraw resources from the routine.

This has implications for all others associated with the routine. Coworkers who depend on that routine will receive personal rents below their aspirations. They might capitalize on resource dependencies to pressure the shirking member to cooperate. Alternatively, coworkers might decide to shirk as well. If this degenerative process continues, members of the firm will search for alternatives in other firms. Eventually, The firm will fail, or more descriptively, it will dissolve (Hirschman, 1970).

Networks between firms. The same logic applies to networks between firms. Managers exercise their authority as agents to search for networks among firms in the value chain. Managers will choose interactions that offer them at least satisfactory personal rents; notably, this may not optimize the rents for the firm as a whole (Levinthal, 1988; Eisenhardt, 1989). Agency problems are clearly an issue here.

As managers negotiate and renegotiate the terms of interactions, subsets of managers (representing firms) reach equilibrium points such that the terms of interactions will not change significantly as a result of further interactions and/or renegotiations. If the equilibrium reached in a given network is not satisfying for all of the participants (i.e., firms represented by managers), some participants may choose to withdraw and seek transactions in another network (Hirschman, 1970). The withdrawal of these participants may cause gaps in the value chain. If these gaps can not be filled, the entire network may dissolve.

Some networks that are satisfying for all of its participants will eventually form. Actors within these networks will tend to stay within the network. Further, they will often work to preserve it (e.g., offer additional economic incentives to retain critical members), thereby preserving their own source of rents. While an equilibrium may exist within the network, disequilibrium may exist between networks and within the industry as a whole. Therefore, the term bounded equilibrium will be used to describe the stable state of such networks. Barring disturbances from other intersecting networks (either inside or outside of a given firm), there will be little motivation for managers to search for alternative transactions as the managers are assumed to satisfice.

Stable networks are functional in that they can enable collectives (e.g., strategic groups, cognitive communities) to achieve goals that could not be achieved by the participants separately. Yet there may be an optimal level of robustness in such bounded equilibria beyond which the network becomes insensitive to environmental signals for change.

The view of business as an n-way exchange of fluid, hierarchical collectives is consistent with phenomena such as joint ventures, equity sharing, mergers, etc. (Pfeffer and Nowak, 1976;

Harrigan, 1988; Lyles, 1988). Cartels form to limit competition or fix prices. OPEC exemplifies the power that such alliances can generate. The free trade agreements between the US and Canada as well as the plans for economic unification in the European Economic Community in 1992 illustrate this process extending beyond the boundaries of a single industry.

Overlapping Constructs

A Venn diagram illustrates the overlap in the definitions of cognitive communities, strategic groups, and networks of interdependent firms (See Figure 1). The three criteria used in definitions are (a) similar cognitive structures, (b) similar assets and positioning, and (c) interdependence and interaction.

The definition of networks is the easiest to illustrate at this point, as there is only one version of it and only one criterion--interactions among interdependent firms. Firms falling into sections A, C, D, and G would satisfy that criterion. While a time dimension is not included in this illustration, it may be useful to add a time based constraint for research purposes to avoid the noise of transient relationships. That is, analyses could be confined to networks that obtain a reasonably robust bounded equilibrium. Of course, what constitutes "reasonably robust" is inherently a judgement call, and should be determined by the specific needs of the study.

For cognitive communities, two definitions have been proposed. The weak definition only requires managers of firms to have similar cognitive structures. This definition encompasses sections A, B, D, and E. In addition to this similarity, the strong definition requires that the members of the cognitive community interact cognitively. This emphasizes the social aspect of social cognition research in psychology. The intersection of the two criteria covers sections A and D.

For strategic groups, the weak definition merely requires similar asset configurations (sections A, B, C, and F). The semi-strong definition adds the constraint of similarity of cognitive structures. The intersection includes sections A and B. The strong definition of strategic groups further stipulates that the firms must interact. Only firms in section A would fit that definition.

Note that the degree of overlap among these constructs is highest when using the strong definitions and lowest when using the weak definitions. For instance, the set of firms fitting the strong definition of a strategic group would be a subset of those fitting the strong definition of a cognitive community. Sets covered by weaker definitions have larger subsets of nonintersecting firms.

There are at least two meaningful ways to use the definitions of these constructs. Researchers could select a definition (weak, semi-strong, or strong) that is appropriate for a given research question, and then use that definition to select a sample of firms for a study. Alternatively, researchers could start with a particular sample of firms (e.g., the US automobile industry), and then determine which level of each definition is satisfied in that sample.

Regardless of whether researchers select the definitions first and the sample second or vice versa, it is crucial that the definitions used when developing hypotheses are identical to those used when operationalizing the constructs. It is likely that hypotheses generated using strong definitions will not be supported if the operationalizations of the constructs only satisfy the weak definitions (e.g., defining strategic groups based only on firm size). Similarly, hypotheses based on strong definitions probably will not be supported if a preselected sample only satisfy the weak definitions (regardless of the measures used).

Empirical Studies Linking the Constructs

In the preceding section, it is argued that cognitive communities, strategic groups, and networks of interacting firms are related constructs. However, at this point, they are related by definition only. Researchers (e.g., P. Grinyer, personal communication, November, 1991) have rightly questioned the existence of such constructs. Are they meaningful? Are they reasonable descriptions of the way practitioners think and behave, or are they merely reflect statistical artifacts?

One approach to answering these questions is to examine the construct validity (Cook and Campbell, 1979) of these collectives. Empirical findings based on any one method in isolation

may be suspect; the degree of bias is unclear. Here, three constructs are assessed using different methods and different types of data. The biases associated with these methods are expected to be fairly unique. If the predicted pattern of relationships between the constructs is observed in spite of these biases, then it would be less plausible that the observed relationships between the three constructs are merely due to methodological artifacts. Support would be gained for the assumption that the constructs exist and are related as described.

Thomas, Porac, and colleagues have conducted a series of studies of collectives in a variety of industries. These include a highly turbulent emergent industry (the computer software industry), a mature industry that is undergoing very gradual changes (the retail grocery industry), and a mature industry that has become extremely stable over time (the Scottish knitwear industry). The three industries provide an ordered set for study. The software industry marks one extreme as it is continuously changing. The knitwear industry marks the opposite extreme as it has changed very little over the years. The grocery retail falls somewhere between those extremes.

US Software Industry

The software industry was selected to examine the nature of cognitive communities under conditions of extreme ambiguity. There are a large number of partially overlapping, yet diverse niches. Hence, there is considerable ambiguity regarding which set of forces impinging on the firm are most critical. Further, rapid technologic change creates considerable ambiguity regarding changes over time.

In a study of twenty software-development start-ups, cognitive orientations and pervasive social networking were found to be critical in the start-up process (Levenhagen and Thomas, 1990). Due to the continuous changes in this industry, there is little chance of any particular perspective being repeated often enough to establish and spread as a shared industry recipe. "Entrepreneurs in those markets seem intent on creating rules to new competitive games by intuitively trying to create new product categories, new kinds of firms, and growth markets"

(Thomas and Porac, 1991). The only shared beliefs reflected (a) the awareness of ambiguity and (b) the perception that the ambiguity represents an opportunity.

Levenhagen's current research for his dissertation examines the degree of consensus throughout the value chain with respect to desirable product characteristics. Preliminary results across firms that are vertically related in the value chain (i.e., suppliers and buyers) are consistent with previous findings across horizontally related firms (i.e., rivals): there is little consensus on what the ideal software package in a particular niche should be like.

UK Grocery Retail Industry

The grocery retail industry is much more stable than the software industry. In a pilot study used to assess similarities and differences in views, six to ten managers were interviewed from each of three organizations representing a range of supermarket retail operations. Results revealed that cognitive taxonomies of firms in the industry varied widely from firm to firm. Further, differences were found across managers within the firms. It was suggested that the taxonomies were richer in areas that the given manager was most familiar with. This familiarity effect was evidenced by more taxonomic levels, more categories at any given level, and richer lists of attributes associated with each category.

When managers make sense of a market, the resulting cognitive structures reflect the elements that the manager encounters most often and is most familiar with. While this certainly reflects a cognitive bias, the underlying cognitive heuristic seems relatively pragmatic.² Cognitive structures are developed to fit the managers personal needs in terms of decision-making and problem solving.

Two subsequent studies have been performed to compare a cognitive approach with a more conventional approach to industry and competitive analysis (e.g., Porter, 1980; McGee and

²Presumably, a nonbiased structuring would reflect the industry in its entirety with uniform richness throughout, but this assumes that industries are clearly bounded. This is arguably not the case as most industries are better described as fuzzy sets than as discrete units (Porter, 1980).

Thomas, 1986). In the economics oriented study, Lewis and Thomas (1990) and Carroll, Lewis, and Thomas (forthcoming, April, 1992) adopted a strategic groups approach to identify the group structure in the industry and the competitive recipes that defined the groups. Annual data reflecting scale and scope dimensions of strategic choice were obtained from the largest 16 multiples (chains) over a seven year period.

In the cognition oriented study, questionnaires were administered to a large number of managers within two retail operations: a large multiple (chain) and a large coop.³ Questionnaires assessed each manager's views about career issues, who they viewed as competitors, the attributes of those competitors, and the competitive structure of the industry.

The results from the cognitive data were similar to those from the economic analyses with respect to the key strategic dimensions. Multi-dimensional scaling of the cognitive data indicated that there were three key dimensions in this industry: store size, geographic coverage, and price/proportion of own-label lines. These dimensions reflect the economies of scale and scope noted in the economic analysis of the industry.

In addition to identifying key strategic dimensions, the results of the multi-dimensional scaling procedure were used to plot the firms in the cognitive representation of the strategic space. This plot was compared to the strategic groups identified using a cluster analysis on the economics oriented data set. While the groupings from the two methods were not identical, many of the firms were consistently grouped together.

Scottish Knitwear Industry

A third set of studies was conducted on the Scottish knitwear industry which exemplifies stability. "This particular group of firms was thought to be an ideal case for studying the influence of shared beliefs and competitive recipes given its small size, cultural homogeneity, geographical characteristics, and long-standing traditions" (Thomas and Porac, 1991).

³The identity of these firms are withheld to honor a guarantee of confidentiality.

A pilot study (Porac, Thomas, and Baden-Fuller, 1989) with top managers from approximately 20 firms replicated findings from the grocery retail study. The richness of taxonomies reflected a given manager's demands for cognitive processing, and competitors were firms in the same taxonomic level as the manager's firm. Notably, these managers only listed other Scottish firms as their rivals; Italian producers were perceived as being in different businesses.

In a larger study, questionnaires were sent to 260 firms; 89 usable questionnaires were returned. A cluster analysis was performed on 75 strategic variables reflecting each firm's choices regarding raw materials, production methods, distribution channels, and end consumer. Thus, the resulting strategic groups were based on inputs, throughputs, and outputs.

If firms are geographically close together and have similar inputs, throughputs, and outputs, then the firms will probably compete for suppliers, workers, equipment, buyers, etc. Network analysis revealed that the densities of both cooperative and competitive ties were higher within the groups than between them. That is, firms are more likely to be perceived as rivals and/or allies if they are in the same economically based strategic group than if they are in different groups. The differences in the density of interactions within groups versus between groups are very consistent in this sample. When network analysis used the patterns of competition and cooperation to predict which strategic group a firm was in, the UCINET package was 100% accurate in placing firms into the strategic groups that had been identified using cluster analysis.

In comparing lists of rivals and allies provided by the managers, it was found that the sets were not mutually exclusive. In fact, the overlap was fairly strong ($r = +.32$). This suggests that cooperative and competitive interactions are not diametrically opposed. They may be better thought of as tools in a repertoire of behaviors that firms use to manage economic interdependence.

To determine if the members of each group had a shared sense of identity, each manager was asked to rate a number of terms to indicate which terms best describe his firm. A MANOVA was performed using strategic group membership as the independent variable and descriptiveness ratings as the dependent variables. The significant results indicated that there was greater variance

between strategic groups than within them in terms of how managers label their firms. Shiffée tests suggested that these differences followed fairly simple patterns reflecting relatively discrete categories. This suggests that the members of these strategic groups have some consensus on the type of firms they are.

Findings suggest that managers do perceive distinct groups of interdependent, interacting firms in the Scottish knitwear industry. Different groups use slight variations on a common recipe. Still, an industry recipe seems to exist within the greater cognitive community (Scottish knitwear producers). The strategic groups are part of the same superordinate category (i.e., Scottish knitwear) while other producers (e.g., Benetton) fall into other categories (e.g., Italian knitwear) at that superordinate level.

As noted earlier in this section, the similarity in this shared set of beliefs at the strategic group level, and to a lesser extent at the industry level, is probably due to the small size, cultural homogeneity, geographical characteristics, and long-standing traditions. The remarkable stability in this industry may be due to the fact that it has been virtually a closed system. There have been very few avenues through which novel ideas could enter, and the established equilibrium throughout the value chain has been robust and highly resistant to change.

Interpretation of Empirical Findings

Given that the theories from the three streams of research address incompatible levels of analysis, make contradictory assumptions, etc., it is difficult to use deductive logic to integrate the theoretical propositions from various perspectives. Alternatively, inductive logic could then be applied to empirical findings (data) to gain insights into the relationships between the different perspectives. The goal would be to integrate the perspectives by extending existing theories or to develop a theoretical framework that subsumes existing theories by addressing the union of the phenomena studied from the three perspectives (Feyerabend, 1970).

Here, the empirical findings reveal convergence across the cognitive, organizational, and economic approaches in the two stable industries. Given that the constructs were operationalized

using different methods and different types of data, it is unlikely that the results were due to statistical artifacts or other extraneous factors. This lends credibility to the theoretical argument that these constructs do exist and may overlap to a large degree.

However, the definition of a cognitive community was not be satisfied in the software industry even though firms were interacting as rivals or as buyers/suppliers. There are several possible causes. It is conceivable that the measure of cognitive similarity was a poor operationalization for the construct. This explanation does not seem plausible as the method replicated that used in a number of the studies the other two industries.

A more plausible explanation is that the relationships among the economic, psychological, organizational factors may be moderated by some other factor(s). For example, the degree of ambiguity in an industry could influence the accuracy of managerial perceptions. In ambiguous, rapidly changing environments, the initial (mis)perceptions of managers drive subsequent social enactment processes. In the absence of industry-wide consensus, many socially constructed networks have little systematic impact on the structure of the industry while a select few may cause Schumpeterian revolutions. In such a revolution, the economic reality should come in line with the perceptions of members of the innovating cognitive community (i.e., those enacting their shared vision). Consequently, there should be close agreement between economic, cognitive, and organizational measures within that particular cognitive community. For the rest of the industry, however, there would be increased discrepancies between perceptions and economic realities. Generally, it will take some time for the victims of the Schumpeterian shock to recognize the change and interpret it, let alone respond to it.

In a relatively stable environment (the grocery retail industry) there is a greater correspondence among economic, cognitive, and organizational factors. However, the discrepancies do exist. In an extremely stable, narrowly defined industry (the Scottish knitwear industry), the degree of correspondence between economic, cognitive, and organizational factors is remarkably high, and for some comparisons, it is perfect. The moderating factor which weakens the causal relationships (i.e., ambiguity) is not prominent in this industry.

Intuitively, it seems as though managers try to be economically rational when making decisions about interactions with buyers, suppliers, rivals, etc. As these interactions define Porter's (1980) five forces, changes in the patterns of interactions can alter the structure of the industry. Managers should try to anticipate changes in patterns of interactions (industry dynamics) and incorporate these expectations in developing competitive strategy. Figure 1 sketches the loose coupling of these streams of research. If industry structure is undergoing rapid change and/or if there is ambiguity about economic forces operating in a particular niche, then there will be slippage in the causal links due, in large part, to misperceptions of managers.

 Insert Figure 1 about here.

Developing an Integrative Theoretical Framework

The stream of research described in the previous section examines collectives within industries from several perspectives and reveals a considerable amount of overlap. Cognitive communities, strategic groups, and networks of interacting firms do seem to be related, and the relationship is influenced by the degree of ambiguity in the industry.

Within this context, Porter's (1980) *Competitive Strategy* may serve as a useful platform for building an integrative theoretical framework: it is simple, well known, and incorporates elements from economics, psychology, and OB. A broad cycle of reciprocal causation is proposed in which economic factors (e.g., industry structure) influence psychological factors (e.g., perceptions of economic incentives), which subsequently influence organizational factors (e.g., the social enactment of markets), which in turn influence economic factors (e.g., industry structure), and so on.

Porter's approach is based on the premise that formulating effective strategy requires (a) industry analyses and (b) competitor analyses. That is, strategist should (a) identify firms that might influence profitability and (b) predict what those firms will do.

Porter argues that the boundaries and the structure of a firm's industry depend on the organizations that are most likely to affect that firm's profitability. Hence, the approach is based on networks of economically interdependent firms. This is the essence of Porter's five forces model. Vertical relationships (i.e., with buyers and suppliers) form networks of transactions that run through the value chain. As firms compete for transactions with buyers and/or suppliers, networks of horizontal relationships emerge among rivals, producers of substitutes, and potential entrants.

After determining *who* is interacting in this grand network, it is necessary to predict *how* they will interact. A series of competitor analyses must be performed to generate competitor response profiles (i.e., the likely responses to a given event). Predicting the actions of firms in extended rivalry is nontrivial. In the value chain, both vertical (supplier, buyer) and horizontal (rival, potential entrant, producers of substitutes) related firms mutually influence each other's profitability. These relationships can be characterized as mixed motive games similar to the prisoners' dilemma game: there are conflicting incentives to cooperate and compete. This causes uncertainty when predicting the behaviors of firms.

To reduce the uncertainty, Porter recommends generating response profiles based on, among other things, the goals and assumptions of managers at various levels of each firm. Porter recognizes that these managers may not agree with each other, but he does not suggest how to combine conflicting perspectives to determine the intended strategy the firm as a whole will follow.

It is argued that interactions among firms will follow economic rationality to the extent that its participants can perceive "economic realities." Some findings in group problem solving in social psychology literature (e.g., Laughlin, 1980, McGrath, 1984) become relevant here. As the ambiguity and complexity of a problem increases, it becomes much harder to convince others to accept a given solution. Two sources of ambiguity are expected to decision processes in business: (a) ambiguity over which subset of forces is operating within a niche at a given time and (b) ambiguity due to changes in those factors over time.

If an economically rational solution can be found and it is fairly obvious to all participants, then the network is likely to enact that pattern of transactions. As the problem becomes more ambiguous, economic rationality will play less of a role and charismatic leadership and the selling of visions will become more important. Also, as ambiguity increases, larger proportions of the network will have to be firmly committed before the entire network will accept the new pattern and enact it with material transactions.

One way to think of this is to decompose risk of a venture into two parts that are inversely related to (a) the probability of getting all the necessary participants to cooperate and (b) the conditional probability that the venture would be profitable given that all the participants cooperate. Convincing potential participants that all the other elements of the network are taken care of is usually a critical aspect of selling a vision. As more parties give firm commitments to participate, the entrepreneur's vision generally gains more "credibility" or "legitimacy," and it becomes easier to convince remaining parties to jump on the bandwagon.⁴

While it is possible and often useful to consider a separate networks for each force or for particular segments of the value chain, the networks of firms associated with the five forces are inherently woven together in a system that encompasses the entire value chain. Firms are enmeshed in a complex web of interdependence. Disturbing one strand (i.e., a link between two firms) may send ripples throughout the entire web.

In the context of this analysis, how do industries change? They do not change in a piecemeal fashion, because an industry is an interrelated system. Change in one element of an industry's structure tends to trigger changes in other areas. For example, an innovation in marketing might develop a new buyer segment, but serving this new segment may trigger changes in manufacturing methods, thereby increasing economies of scale. The firms reaping these economies first will also be in position to start backward integration, which will affect power with suppliers--and so on. One industry change, therefore, often sets off a chain reaction leading to many other changes. (Porter, 1980, p. 184)

⁴Interestingly, many of the innovations that have made it (i.e., developed sustainable markets) were not the best technology in the short-run (Arthur, 1989) or the long-run (Agnew, 1981; Cowan, 1987; David, 1985). Clearly, choices made in forming new ventures and new markets are influenced by factors other than formal-evaluation processes (Burbelman, 1983; Bower, 1970; Howell and Higgins, 1990; Kanter, 1983; Schon, 1963).

In the first wave of the competitor analysis, response profiles are generated for the extended rivals (i.e., buyers, suppliers, rivals, potential entrants, producers of substitutes). This would yield a preliminary industry forecast for strategy formulation. A SWOT analysis is performed in relation to the industry forecast. Then, a series of possible strategic moves is generated.

In an informal game theory style, this initial set of possible moves is used as input for a second iteration. Results from the second iteration would be used as input for the third, and so on. The strategy with the greatest predicted long-run payoff (given the likely responses of extended rivals) would be implemented.

Porter (1980) designed the book to aid practitioners in making more economically rational decisions. While the primary emphasis is on the content of the decision process, Porter alludes to a number of process issues as well (e.g., bounded rationality of managers, the impact of emotions on cognitive processes, political conflicts within organizations).

For example, Porter (1980, p. 234) notes that this approach to strategy formulation is problematic in that the computational demands of the forecasting method exceed the bounds of human cognition. Porter suggests using scenarios as tools for cognitive simplification. This allows the manager to consider higher level patterns of interactions among interdependent firms (e.g., the breakout of cut-throat competition in oligopolies, convergence on focal points).

Along with process issues within a single individual, Porter raises interpersonal or social/organizational process issues. For example, if the problem is divided among members of an industry analysis team, Porter notes that there may be problems in communicating and integrating information across analysts. In group problem solving terms, there tends to be significant "process loss" (McGrath, 1984). Further, analysts from different departments within a given firm may be operating on very different agendas.

Agency problems exist to the extent that managers' perceptions of personal utility of alternatives actions do not parallel the utility for the firm as a whole. Each manager acts opportunistically to obtain the best personal outcomes knowing that the other firms may respond.

However, other members of the managers' firm may use the reactions of other firms as information in subsequent cognitive and political processes. If a manager makes decisions that result in lower payoffs for others within the firm, that manager will lose credibility and power. New coalitions may form as the other managers attempt to protect their own interests.

Summary of Framework

Porter argues that to make economically rational decisions, it is necessary to consider the cognitive processes within each decision makers and the political processes among those individuals. This juxtaposition of content issues (from economics) and process issues (from psychology and OB) provides a powerful framework for research in strategic management. Content models can then be used to suggest economically rational patterns of transactions with buyers and suppliers as well as interactions among rivals, producers of substitutes, etc. This intendedly rational perspective is then enriched by the recognition that both cognitive and political processes can distort the decisions in complex ways. The empirical findings discussed in the previous section suggest that such distortions are most likely to occur in highly ambiguous environments. Process models may be useful in predicting when and how a firm's actions will deviate from economic rationality. If the models can predict such deviations, they could improve the accuracy of competitor response profiles. These, in turn, could improve the accuracy of the scenario analyses and the effectiveness of strategy formulation based on those scenarios. Ultimately, this could mean improved performance for the firm.

Porter (1980) notes that a critical problem in attempting to perform a comprehensive industry analysis is that the computational demands exceed the bounds of human cognition. One possible solution to this problem is to use of analytic models on high speed computers to extend the boundaries of rationality with respect to processing speed and memory capacity. Current research includes efforts to develop a mathematical model and an artificial intelligence model (Carroll, 1991). Both of these models have been designed to approximate economically rational decisions. However, the models attempt to simulate distortions in assumptions and goals due to

cognitive biases and the effects of emotional reactions. These cognitive models have also been designed to predispose individuals to various forms of political activities within the firm (e.g., coalition formation, political infighting).

Summary

The main thrust of the stream of research outlined in this paper is that managers may be intendedly rational in the process of developing competitive strategy. However, the process is influenced by cognitive and socio-political forces as managers interact within and between firms. This has implications for patterns of cooperative and competitive interactions among firms and, more broadly, for industry dynamics.

The proposed theoretical framework and models represent an attempt to integrate insights from economics, OB, and psychology. These are based on partially overlapping patterns of data obtained in a series of interdisciplinary studies of collectives within industries. The convergence and divergence of the findings were used to drive the integration of these perspectives. The resulting models use an open systems orientation to predict phenomena at several units of analysis simultaneously. The models are intended to ultimately predict industry dynamics, although a thorough test of this aspect of the models may be deferred to subsequent studies.

Future research in this stream will be directed toward improving the predictive accuracy of these and subsequent models for use in academic research. To make the models useful for practitioners, heuristics will be developed for cases in which information about rivals is sparse.

Concluding Remarks

Theories from a number of disciplines (e.g., economics, OB, psychology) have been used to understand phenomena in strategic management research. Each perspective provides a unique set of insights, but there has been relatively little success in putting the pieces of the puzzle together.

Firms often deviate from economically rational courses of action even when the economic incentives are relatively obvious. While it is often noted that psychological and socio-political forces probably combined to cause that deviation, there are few if any attempts to formalize how those factors combine. The details of the interactions must be clearly specified in order to predict when and how firms will deviate from economically rational behaviors.

Similarly, it is unclear how psychological and socio-political forces influence firms when economic rationality does not dictate an obvious course of action. Integrating these factors would make a major contribution to understanding strategic actions in emergent markets where industry boundaries and structure are ambiguous. It could also further research in oligopolies where firms are typically faced with conflicting incentives to cooperate and compete.

It is unlikely that interdisciplinary theories will be developed in relatively more focussed fields. Interdisciplinary research should be one of the primary distinctive competences of strategic management as a field, and there seems to be sufficient demand for interdisciplinary research within this field to make such ventures profitable. Further, it is reasonable to assume that neighboring fields (e.g., I/O economics, OB, social and industrial psychology) would be interested in importing interdisciplinary theories. This development could allow strategic management to begin balancing the exchange of theory that has been virtually a one-way street since the inception of the field of strategic management. This would certainly go far in improving the credibility of strategic management as a science.

The potential value-added by strategic management can be put into business terms by conceptualizing technologies as knowledge structures (XXX GET CITE FROM HOWARD XXX, 19XX). Licensing technologies reduces start-up costs (e.g., R&D expenditures) for the receiving organization. These technologies can be applied directly or combined with other technologies in novel ways within the receiving organization as they develop their own innovations. In an academic environment, exporting interdisciplinary theories to traditionally more focussed fields should allow their researchers to push back the boundaries of those narrowly defined fields with substantially less effort; the technology (knowledge structures) for linking their known body of

theories to a wealth of theories in other disciplines could be provided by strategic management researchers. For an entrepreneurial perspective, this represents a remarkable opportunity for strategic management as a field.

Another way of approaching this issue is to compare the development of a scientific fields to the economic development of nations. Strategic management as a field may wish to model its development after the economic development of Japan. That nation initially imported technologies and merely applied them at low cost. The meteoric rise of Japan as an economic power began when the imported technologies were combined and the resulting synergies represented significant additions within the value chain.

The initial criticism of the Japanese firms was that they could only copy other technologies. They could not innovate by themselves. Similarly, strategic management has been labelled as an applied field. There is a widely held belief that this field is not capable of, and should not be held responsible for, making significant contributions to theory development. Passing on this bias is perhaps the greatest disservice educators within the field could do to their doctoral students.

First, in a practitioner-oriented field such as strategic management, development of integrative theories could provide a more holistic view of firms and industries. More to the point, it could improve techniques for forecasting industry dynamics, thereby improving the effectiveness of practitioners in developing competitive strategies. The contribution to practitioners would ironically be hampered by fostering the belief that strategic management should focus on applying theories, rather than developing them.

Second, in addition to this internal damage to the field, spreading such beliefs predisposes future generations of researchers to continue in the tradition of a staggering trade-deficit for theories. This may fuel serious doubts about the legitimacy of strategic management as a science. The opportunity for theory development clearly exists. It is hoped that the field will not turn its back to the future by clinging to the ways of the past.

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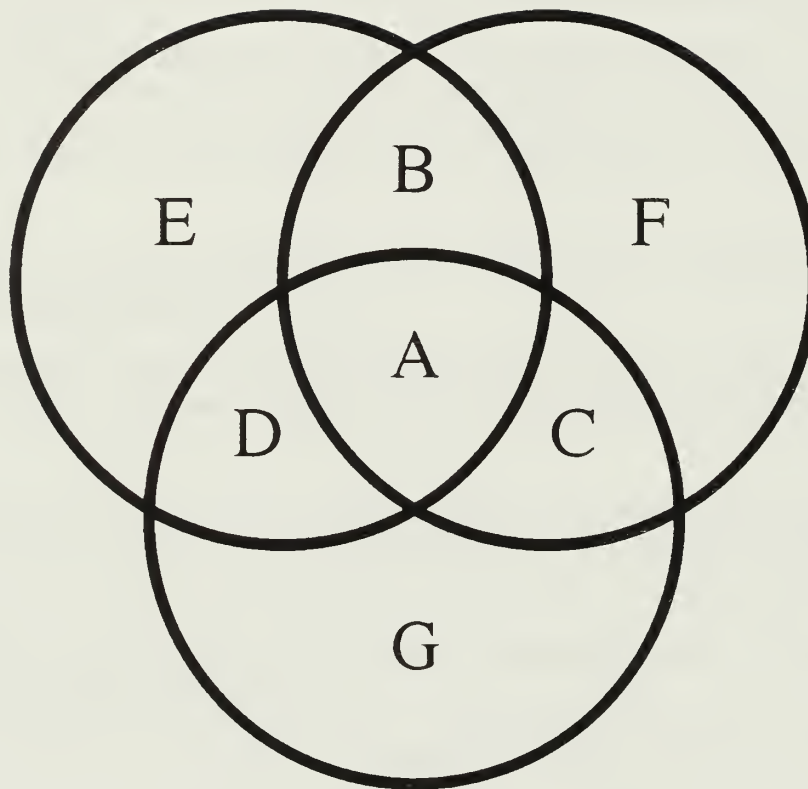
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**SIMILAR
COGNITIVE
STRUCTURES**

**SIMILAR
ASSETS AND
POSITIONING**



**INTERDEPENDENCE
AND INTERACTION**

Figure 1. Venn Diagram Reflecting Overlapping Sets of Firms that Would be Encompassed by Using Various Combinations of Criteria

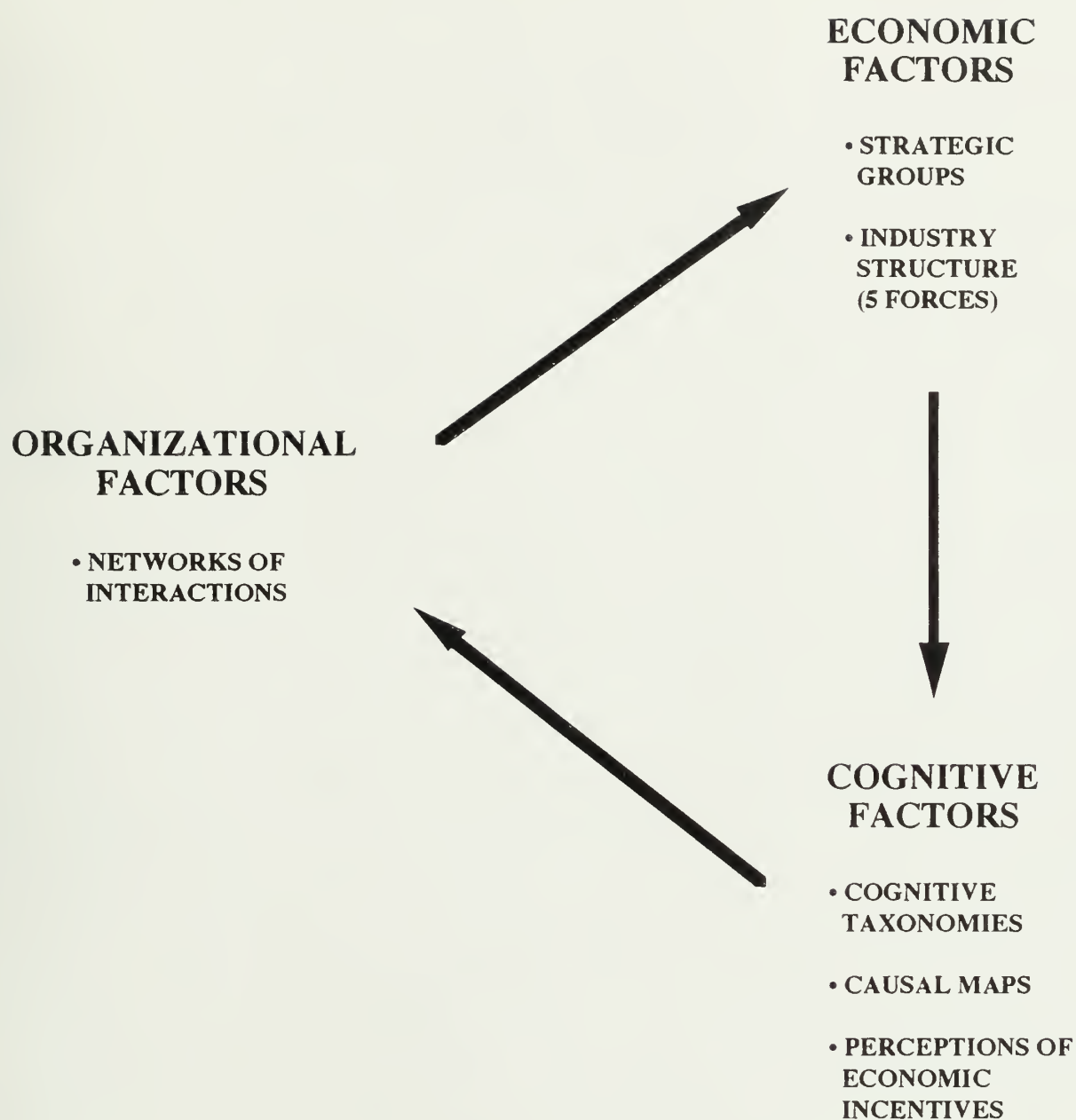
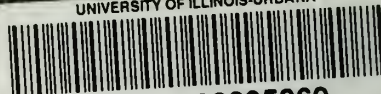


Figure 2. Sketch of the Cyclical Patterns of Causal Links Between Various Cognitive, Organizational, and Economic Factors.

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